# The American Fertilizer

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*See page 25*

...THE...

# AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 98 MARCH 27, 1943 No. 7

## Changes in Fertilizer Price Ceilings

Maximum prices to dealers and consumers of mixed fertilizer, superphosphate, and potash were modified, in certain localities and under particular conditions, by the Office of Price Administration, on March 23rd.

Revised Maximum Price Regulation No. 135 (Mixed Fertilizer, Superphosphate, and Potash) provided that, if a fertilizer manufacturer's price schedule included an offering price to consumers, such offering price would become the maximum price at which any dealer in that sales area might sell to consumers. For example, in Mississippi and Louisiana east of the Mississippi River, most manufacturers sell solely to dealers but their price schedules carried an offering price to consumers five per cent higher than their prices to dealers. For that reason dealers in that territory, even though they customarily had sold at margins higher than five per cent, were limited by that provision to the five per cent profit margin.

Under the new amendment, a dealer must observe the manufacturer's price to consumers only when the manufacturer's price schedule specifically suggests that such a price be charged by dealers, or, if the schedule recommends dealer's margins, those must be observed. Otherwise a dealer may add to his cost for fertilizer a margin no greater than that provided in Appendix C of the Regulation. The amended appendix now allows dealers a maximum margin of ten per cent above cost in Mississippi and Louisiana east of the Mississippi River.

Another change effected by the amendment (No. 2 to Revised Maximum Price Regulation 135, effective March 27) is the extension of the base period in Florida to November 30, 1941. July 31, 1941, the base period established by the regulation, worked a hardship on some Florida manufacturers requiring them to use their 1940 price schedules. The new amendment corrects this handicap by permitting Florida manufacturers to use that one of their schedules first issued between July 1 and November 30, 1941. It further provides that price adjustments for special fertilizer ingredients may be made at the prices in effect from February 16 to 20, 1942.

The new amendment furthermore modifies maximum prices for Victory Garden fertilizers to reflect the difference between the cost of organic nitrogen originally required in such fertilizer and the lower cost of chemical nitrogen which now may be used under authority of the Food Production Administration of the U. S. Department of Agriculture.

Specific provision also is made for the establishment of maximum prices for specialty fertilizers as distinguished from ordinary agricultural fertilizers. Specialty fertilizers are prepared mixtures commonly used for lawns, shrubbery, and the like, and usually are sold in containers of 100 pounds or less. Prohibition of the use of chemical nitrogen in specialty fertilizers has made it necessary that manufacturers reduce grades in many instances so that nearly all specialty fertilizers now are different either in grade or kind from those offered for sale in the base period fixed by the Maximum Price Regulation.

The new amendment clarifies the method to be used by fertilizer manufacturers in establishing maximum prices for any new grades of fertilizer approved by the Secretary of Agriculture subsequent to December 31, 1942, and clearly defines the method of price adjustment

required when any change is made in the fertilizer by reduction of its organic nitrogen content.

Other minor changes effected by the new amendment are:

(1) To expedite action in the case of bids to government agencies or contractors on governmental projects, the previously required 10-day waiting period for proposed prices of new grades of fertilizer is provisionally waived.

(2) Authority to either approve or disapprove prices filed in the National Office of OPA is delegated by the Administrator to the head of the Agricultural Chemicals Section.

(3) Sellers are reminded that the Regulation establishes maximum prices at which fertilizer may be sold to farmers and other consumers but does not prohibit sales at prices lower than the maximum.

In issuing the amendment, OPA republished Regulation 135, complete with all changes made by amendments.

## Directive on Chemical Nitrogen

The Food Production Administration, U. S. D. A., has issued Directive 1 under Food Production Order 5. It relates to the distribution of chemical fertilizer containing chemical nitrogen.

Manufacturers are directed to allocate such fertilizer to areas of immediate need before supplying it to areas where applications are made later.

Farmers' requirements for straight nitrogen material (for "A" crops or "B" crops) must be supplied from any straight nitrogen material available, consideration being given to the variation between the nitrogen content of the material previously used by the farmer and that to be delivered.

The requirements of paragraph (h) (3), FPO 5, for preferred deliveries of chemical fertilizer containing chemical nitrogen for "A" crops, are applied to specific situations. In general, the Directive calls for full deliveries for "A" crops and deliveries for "B" crops in such quantities as the "current and assured stock position" of the manufacturer, dealer, or agent may warrant in view of the over-all demands on him for all crops.

Computation of requirements and making of deliveries of chemical fertilizer containing chemical nitrogen pursuant to paragraphs (h) and (i) of FPO 5 must not be based upon a percentage of the quantities of such fertilizer previously used by the applicant and must not be limited by the acreage of the crops he has previously grown. This seems to apply to both "A" crops and "B" crops.

## March Meeting of Industry Advisory Committee

A meeting of the Fertilizer Industry Advisory Committee was held on March 10th, David Meeker, U. S. D. A., presiding. Present also: W. E. Lafkin, Walter Lloyd, F. W. Parker, L. G. Porter, W. F. Watkins, U. S. D. A.; J. C. Freeman, C. G. Gran, Richard Harrison, Henry Huschke, Roland Payne, J. B. Pratt, Jr., OPA; Dale C. Kieffer, H. H. Meyers, WPB; E. R. Lerner, Miss Helen Seymour, WMC; Maj. R. H. Morrish, Maj. H. B. Musser, War Department; Horace Albright, George Cushman, M. K. Derrick, R. B. Douglass (for Oscar F. Smith), N. E. Harman, S. B. Haskell, M. H. Lockwood, M. H. McCord (for C. F. Hockley), John A. Miller, John L. Morris (for Wm. B. Tilghman), Nelson Myers (for J. A. Woods), Weller Noble, O. J. Noer, H. V. B. Smith, F. J. Woods, members of the Committee; Charles J. Brand, N. F. A., O. J. Noer, Milwaukee Sewerage Commission, Milwaukee, Wis., and H. V. B. Smith, H. J. Baker & Bro., New York, N. Y., have recently been added to the membership of the Committee.

During discussion with reference to the problem of getting out fertilizers to the farmers during the present season, labor shortages in various areas were reported. Government officials pointed out that the only agencies available to fertilizer manufacturers for getting labor are the local agencies. It was suggested that manufacturers maintain close contact with local employment agencies and with local draft boards. It is understood that a memorandum on the seasonal character of the industry is going out from the Bureau of Labor Utilization in Washington to local draft boards. It was suggested also that posters in the plants and other publicity forms be used advising laborers of the essentiality of the industry's work, and that local boards be reminded to take notice of the national policy of essentiality of fertilizer industry activities.

The further suggestion was made that the help of agents and dealers be enlisted in recruiting laborers from their communities for the plants during the rush season. It was thought that regional committees of the industry to work with the Government agencies in local areas on labor problems would be helpful. Industry members pointed out that prompter action by WLB agencies on requests for permission to increase wages is needed. To put labor for fertilizer plants in the same

category with agricultural labor would require, it was said, an Act of Congress.

In discussion of transportation problems, Government officials pointed out that the gasoline and fuel oil situation is even more pressing at the moment than the rubber situation. The demand for petroleum products is increasing without any corresponding increase in supplies. Consumption must be kept down and even reduced, especially in the eastern shortage area. Two problems of eligibility for gasoline are involved: (1) general eligibility of the industry and (2) eligibility of individuals within the industry. The sales function is not necessary in war time and can be curtailed or dispensed with. Functional separation of staffs of salesmen and technicians is almost compulsory. The educational work necessary to be done by traveling representatives of fertilizer manufacturers in connection with operations under FPO 5 was pointed out by industry members. Officials said that the eligibility of the work of these representatives was open to question and that it could be done otherwise than through personal contacts, as through brief, clear, and intelligible pamphlets. They said they were reluctant to refuse additional gasoline, as they have often had to do. There were no indications that more gasoline would be allotted. Any inequities reported will be corrected by reducing the higher allotments but not by increasing the lower.

Attention was called to the probability that ammonia solutions in considerable quantities would be obtainable after May 1 throughout the summer. These solutions must be used by fertilizer manufacturers in the ammoniation of superphosphate if their nitrogen content is to be conserved for agriculture for the 1943–1944 season. Four courses of action should be followed energetically: 1. Superphosphate manufacturers furnishing supplies to small mixers should see that superphosphate is obtainable by these mixers throughout the period when ammonia solutions are available; 2. Dry mixers equipped to use ammonia solutions should take them promptly as they become available; 3. Dry mixers not equipped to use ammonia solutions should buy ammoniated superphosphate rather than superphosphate itself; and 4. Superphosphate manufacturers should urge mixers to take ammoniated superphosphate. Thus the maximum possible amount of solutions will be absorbed in fertilizers.

With respect to changes in grades that either agronomists or members of the fertilizer industry may desire to ask, Government officials feel that suggestions calling for consideration and action along this line by State or other authorities should be submitted for advance consideration. Similar thought was expressed with reference to any modification that might be deemed necessary or desirable in State fertilizer control administration.

Mr. Watkins announced the appointment of the following subcommittees—chemical nitrogen: Messrs. Haskell (chairman), Sanford, and J. A. Woods; organic nitrogen: Messrs. Douglass (chairman), H. V. B. Smith, and F. J. Woods; phosphate rock, sulphuric acid, and superphosphate: Messrs. Derrick (chairman), Farley, and McCord. The WPB potash committee will be utilized.

The next meeting will be held April 14.

## Great Britain to Get Major Part of Concentrated Superphosphate

The U. S. Department of Agriculture announced on March 15th that, on the recommendation of the Combined Food Board, the major part of the North American production of concentrated phosphate fertilizers has been allocated to the United Kingdom. No definite figure as to the percentage of output that these shipments will represent, is available. It is understood, however, that all the production of this material by TVA will be shipped abroad, except for a small amount to be retained for experimental purposes and for use on its projects in the Tennessee Valley.

## Fertilizers for Airfields

It has been estimated that more than 500,000 acres of airfields will require fertilizers this spring, in the amount of more than 120,000 tons. These requirements will have high priority and the industry is cooperating with the Engineer Corps and the Air Corps in filling their needs. The nitrogen and potash used for this purpose will be replaced by WPB if so recommended by army engineering and operating officials in charge.

## Changes in North Carolina Law

Changes in the North Carolina fertilizer law were ratified on March 8th. The principal changes provide that nitrogen-potash top-dressers are excepted from the guarantee as to water-insoluble nitrogen; that the list of approved grades shall be not less than 22 or more than 35; that the Commissioner shall be permitted to allow reasonable tolerances for short weights due to losses through handling and transportation.

# Carbon-Hydrogen Ratios in Organic Fertilizer Materials in Relation to the Availability of Their Nitrogen

By EDWARD J. RUBINS and FIRMAN E. BEAR

*New Jersey Agricultural Experiment Station*

*(Continued from the Issue of March 13, 1943)*

### Proximate Analysis of Washed Organics

Since equivalent quantities of carbon from various sources were shown to have different effects on nitrogen availability, it was deemed desirable to know the proportions of certain of these carbon sources in the washed organics. Proximate analyses of 17 materials therefore, were made by the Waksman method (7).* The data are shown in Table 4.

As might be expected from its high nitrogen content, dried blood is largely proteinaceous. This material, as well as two of the process tankages (Hynite and Smirow), and acid fish scrap contain no carbohydrate substance but possess varying quantities of resistant carbonaceous substances that are classified under "lignin." The low-protein materials showed, as a rule, correspondingly high proportions of hemicelluloses, cellulose, and lignin. It is the easy decomposability of the first two of these compounds that presumably plays the major role in rendering the nitrogen of these low-protein materials relatively unavailable.

Of the two sludge products analyzed, Milorganite, an activated-sludge product, is high in crude protein, whereas sewage sludge is low in this constituent, much of its nitrogen having been lost during the anaerobic decomposition process. As would be expected, the availability data show that the activated sludge has a higher nitrogen-fertilizer value than the sludge.

*Numbers in parentheses refer to references at the end of the article.

### The C–N Ratios of Washed Organics

The C–N ratios of the washed materials are listed in Table 2. Carbon was determined by the electric combustion method as described by Fisher (1). In the majority of cases the dividing line between good and poor nitrogen sources was defined by a ratio of about 10. None of the materials whose C–N ratios exceeded this value showed good nitrogen availability by either the vegetative or the

TABLE 4

Percentage Proximate Analyses of Washed Organic Materials

| Fraction | Cottonseed meal | Special soybean meal | Castor pomace | Cocoa meal | Alfalfa hay | Tobacco stems | Peanut hull meal | Hynite tankage | Smirow | Dried blood | Acid fish scrap | Bovung | Horse manure | Milorganite | Sewage sludge | Garbage tankage | Manito humus |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ether-soluble | 7.8 | 1.2 | 0.5 | 2.2 | 2.7 | 1.6 | 0.7 | 8.0 | 2.9 | 0.6 | 10.9 | 3.0 | 1.9 | 4.5 | 6.5 | 1.1 | 0.2 |
| Alcohol-soluble | 1.0 | 1.6 | 2.6 | 0.8 | 0.6 | 0.8 | 0.4 | 1.1 | 2.4 | 0.9 | 1.8 | 1.6 | 0.7 | 1.3 | 1.2 | 0.5 | 1.0 |
| Cold water-soluble | 0.7 | 4.1 | 2.0 | 1.6 | 3.5 | 2.4 | 0.3 | 3.1 | 1.3 | 1.2 | 2.0 | 1.3 | 1.3 | 1.7 | 0.9 | 0.8 | 0.7 |
| Hot water-soluble | 2.6 | 3.1 | 5.6 | 1.9 | 2.4 | 1.5 | 0.5 | 8.3 | 9.3 | 1.5 | 2.5 | 2.0 | 1.4 | 2.7 | 1.0 | 1.1 | 1.4 |
| Hemicelluloses | 5.6 | 17.8 | 2.3 | 7.0 | 10.6 | 3.6 | 10.1 | 0.0 | 0.0 | 0.0 | 0.0 | 8.9 | 20.3 | 2.5 | 0.0 | 0.0 | 3.2 |
| Cellulose | 7.9 | 9.9 | 11.7 | 15.6 | 29.0 | 19.4 | 34.7 | 0.0 | 0.0 | .... | 0.0 | 23.4 | 25.0 | 0.0 | 0.0 | 11.7 | 0.0 |
| Lignin | 5.4 | 1.6 | 32.2 | 21.1 | 12.5 | 4.1 | 27.6 | 14.1 | 17.4 | .... | 3.1 | 20.8 | 17.3 | 6.6 | 8.2 | 23.6 | 31.6 |
| Crude protein | 50.0 | 34.9 | 24.5 | 16.9 | 11.1 | 4.8 | 4.7 | 51.7 | 44.4 | 89.2 | 49.9 | 10.1 | 6.3 | 34.4 | 10.4 | 16.8 | 16.2 |
| Ash | 3.3 | 2.5 | 6.4 | 9.0 | 3.4 | 37.8 | 1.8 | 6.6 | 4.7 | 2.9 | 21.6 | 15.2 | 8.5 | 27.7 | 55.4 | 34.1 | 28.5 |
| Moisture | 4.9 | 5.4 | 5.5 | 6.3 | 5.2 | 4.6 | 3.8 | 4.3 | 5.9 | 4.6 | 3.4 | 3.8 | 4.0 | 4.2 | 5.4 | 4.1 | 8.1 |
| Total | 89.2 | 82.1 | 93.3 | 82.4 | 81.0 | 80.6 | 84.6 | 97.2 | 88.3 | 100.9 | 95.2 | 90.1 | 86.7 | 85.6 | 89.0 | 93.8 | 90.9 |

nitrification procedure. With the exception of the process tankages, bone meal, Beetle molded scrap, and possibly acid fish scrap and animal tankage, those with C–N ratios below 10 showed good nitrogen availability.

To explain the fact that a natural material of a given C–N ratio yields considerably less nitrate than does a synthetic mixture of $(NH_4)_2SO_4$ and cellulose having the same C–N ratio, at least two factors must be considered: the ease of decomposition of the nonprotein carbon compounds present in the nitrogen carrier; and the nitrifiability of the nitrogen in the proteinaceous material itself. The first factor would explain, in part, the low nitrogen availability of materials with ratios greater than 10, and the second would largely explain the wide differences in availability among those of narrow C–N ratio. The insoluble nitrogen compounds in such materials as process tankage and bone meal are apparently very resistant to microbial decomposition, for they not only have a narrow C–N ratio, but contain little carbon of the type whose decomposition could be held responsible for holding up the release of available nitrogen. A third factor, perhaps, should be added: the effect of the possible presence in the organic material of toxic or inhibitory substances.

Of any two materials of narrow C–N ratio containing nitrogen of good availability, the one with the lower C–N ratio normally contains nitrogen of greater availability. Some deviations from this may be explained on the basis of the type of carbon compounds associated with the nitrogen. For instance, the insoluble nitrogen of castor pomace rates virtually the same by the vegetative and the nitrification tests, as does that of cottonseed meal, yet the C–N ratios of these two materials are 9.36 and 5.40, respectively. Castor pomace, however, contains 32.2 per cent lignin to only 5.4 per cent of this constituent for cottonseed meal. Since lignin plays little or no role in depressing nitrification, castor pomace behaves like a material of lower C–N ratio.

In Table 5, revised C–N ratios were calculated for various organics, after the lignin carbon was deducted from the total. The carbon content of lignin was assumed to be 57.2 per cent, the same as that of the purified lignin used in formulating the synthetic mixtures of varying C–N ratios. These revised ratios conveniently narrow the gap between castor pomace and cottonseed meal. Castor pomace, Milorganite, and cottonseed meal, the availability of whose nitrogen by the vegetative test lies between 50 and 54 per cent (see Table 2), have revised C–N ratios between 5.05 and 5.76, in place of the original values ranging between 5.40 and 9.36. A revision of these ratios, however, does not always bring the results into line. For example, on the basis of the similarity of their original C–N ratios, the nitrogen of sewage sludge, cocoa meal, Manito humus, and garbage tankage should show smaller differences in availability than the data indicate.

**TABLE 5**

**Nonlignin Carbon-Nitrogen Ratios of Washed Organic Materials**

| WASHED MATERIAL | NONLIGNIN C–N RATIO | RECOVERY OF ADDED NITROGEN Nitrification Test (40 Days) |
|---|---|---|
| | | PER CENT |
| Hynite tankage | 4.06 | 33 |
| Smirow | 5.04 | 12 |
| Cottonseed meal | 5.05 | 57 |
| Acid fish scrap | 5.07 | 50 |
| Milorganite | 5.35 | 43 |
| Castor pomace | 5.76 | 62 |
| Special soybean meal | 6.90 | 56 |
| Manito humus | 7.05 | 3 |
| Garbage tankage | 8.57 | 0 |
| Cocoa meal | 10.6 | 5 |
| Sewage sludge | 11.2 | 12 |
| Alfalfa hay | 17.5 | 18 |
| Bovung | 17.7 | −3 |
| Horse manure | 25.2 | −21 |
| Tobacco stems | 26.2 | −9 |
| Peanut hull meal | 35.7 | −4 |

The revised ratios do not improve the situation, for the nitrogen of cocoa meal and sewage sludge shows higher availability than does that of Manito humus and garbage tankage, yet the revised ratios of the former materials are wider than those of the latter. It may also be noted that the revised ratios of the process tankages are entirely too narrow for the availability of their nitrogen in comparison with the other organics.

### Nitrogen in Fractions Separated by Proximate Analysis

Values were obtained for the nitrogen in certain of the fractions separated by the proximate analyses of 17 materials. The data are presented in Table 6, where the nitrogen content of each fraction is expressed in percentage of the total nitrogen of the organic ammoniate from which it was derived.

With the exception of acid fish scrap, those washed organics having a crude protein con-

(Continued on Page 24)

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## *Principal Articles in This Issue*



## Revision of Maximum Price Regulation 108

Additional nitrogenous fertilizer materials have been brought under the same kind of margin control as that provided last March in the original regulation covering nitrate of soda, sulphate of ammonia and calcium cyanamide, the Office of Price Administration announced on March 10th.

Materials now included are ammonium nitrate, ammonium phosphate, castor pomace, fish meal, fish scrap, nitrate of soda-potash, and urea compound.

The average of maximum prices to consumers for these nitrogen materials will not be materially different under the new regulation from the average allowed by the General Maximum Price Regulation, OPA announced.

Maximum prices at the several levels of sale for these materials were established by the General Regulation at the highest prices charged during March 1942. At that time some retail sellers, carrying sizeable inventories, had not raised prices to reflect the higher wholesale prices for some of the materials, and thus were left with margins too narrow to permit profitable merchandising.

Revised Maximum Price Regulation No. 108 (Nitrogenous Fertilizer Materials) just issued, effective March 15, allows manufacturers and dealers to establish maximum prices to consumers by adding a specified dollars-and-cents margin above their cost of the materials.

The $4 margin permitted under the original regulation amounted to approximately 10 per cent of the price to the consumer for the three materials covered. The Revised Regulation, applying also to materials costing more per ton than the three previously covered, maintains a maximum margin of about 10 per cent by providing a sliding scale of gross margins, varying in proportion to the cost of materials to the fertilizer manufacturer.

The Western States, exempted from the original regulation, are now covered. In accord with the established practice of the industry and in recognition of high costs of distribution, fertilizer manufacturers in the West are allowed margins higher than those in the East.

The new regulation provides that maximum prices to consumers shall be determined by adding a margin to the maximum price which may be charged the fertilizer manufacturer or dealer for the material. If a domestic seller of a nitrogenous material chooses to allow fertilizer

manufacturers or dealers a greater margin than that provided in the regulation, he may do so by selling his product to those manufacturers or dealers at less than his maximum price.

Application of the margin to the maximum price which may be charged rather than to the price which actually is paid by the fertilizer manufacturer or dealer, results in a fixed maximum price to consumers instead of one which might fluctuate with each lot of materials purchased. Fertilizer manufacturers and dealers of course may sell at prices lower than those established by application of the maximum margin.

As permitted in the old regulation, fertilizer manufacturers and dealers may pass along actual transportation costs incurred by them, including the recently imposed Federal transportation tax of 3 per cent thereon.

The revised regulation allows the same total amount ($1.50 per ton) as was provided under the original regulation to cover the cost of bagging and other handling of bulk materials bagged by the fertilizer manufacturer. However, the revision provides that $1 of that amount shall be for bagging, and 50 cents for warehousing and handling. The charge of 50 cents likewise may be passed along on materials purchased in bags but stored and handled through the plant of the fertilizer manufacturer. Dealers or agents who perform a warehousing service also may charge 50 cents per ton for that service in addition to the regular margin.

The fertilizer manufacturer is allowed a maximum amount of $1.50 per ton to cover costs of grinding materials such as fish scrap and castor cake, which must be additionally processed to be made suitable for consumer use.

## Link-Belt Issues Abridged General Catalog

Completion of a new 180-page, streamlined, condensed, illustrated General Catalog No. 850 of Standard Equipment, is announced by Link-Belt Company, Chicago.

Representative types and sizes of power transmission and materials handling equipment are included, and preference is given throughout to the more widely adaptable designs.

It is pointed out that by standardizing on a few types and sizes and selecting standard equipment, instead of a needless variety, the purchaser will benefit not only by obtaining better delivery, but also through a reduction in number of spare parts to be carried on hand as insurance against delays in production.

Dimensions, weights, list prices, and other pertinent data are given on chains, sprockets, silent and roller chain drives, bearings, baseplates, takeups, shafting, couplings, collars, clutches, pulleys, gears, buckets, conveyor idlers, screw conveyor, car spotters, speed reducers, etc.

Book No. 850 is particularly designed for the man who orders the repair parts, or wishes to buy just the parts for a new installation. The book will be forwarded to anyone requesting it on business letterhead.

## Amendment on Ammonium Sulphate Ceilings

The Office of Price Administration amended, on March 16th, Maximum Price Regulation No. 205. This amendment is applicable only to sales of ammonia sulphate for other than industrial use. This amendment, effective March 20, provides that a producer, importer, or primary jobber who ships ammonia sulphate from the producer's plant or, in the case of an importer, from the point of discharge, to a warehouse situated at a point other than the place of production or discharge, stores the ammonia sulphate in a warehouse, and then reships it in bags, may add a charge of 50 cents per ton in addition to the charge of $1 and the cost of the bags already permitted by the regulation when the commodity is sold in bags.

# Obituary

## H. ALLISON WEBSTER

Another pioneer in the Tennessee phosphate field has been lost through the sudden death on March 20th of H. Allison Webster, chemist and engineer. Mr. Webster, who was 67 years old at the time of his death, was one of the organizers of the Peerless Chemical Company. He selected most of the phosphate properties now operated by the Monsanto Chemical Company and his reports have been made on many of the largest phosphate areas in the Tennessee field. He was also interested in the development of the ferro-phosphate patents and their use. Mr. Webster is survived by his widow, a daughter, and a son, H. Allison Webster, Jr., who is mining supervisor for the Monsanto Company.

# Bulk Superphosphate During January

January statistics on superphosphate, released on March 20th by Director J. C. Capt, Bureau of the Census, Department of Commerce, show that production amounted to 485,872 tons, an increase of 0.1 per cent over the 485,276 tons reported for December, 1942, and an increase of 12.2 per cent over the 433,035 tons reported for January a year ago. Shipments in January, 1943, amounted to 304,324 tons, a decrease of 13.4 per cent from the 351,596 tons reported for December, 1942, but an increase of 15.9 per cent over the 262,544 tons reported for January, 1942. Stocks on hand at the end of January, 1943, amounted to 960,943 tons, a decrease of 1.3 per cent from the 973,224 tons reported for the previous month and a decrease of 0.2 per cent from the 962,542 tons reported for January, 1942. Comparability of the data on receipts, shipments, and stocks is slightly affected by the reclassification of certain quantities of superphosphate formerly reported in dry base and mixed goods. The item dry base and mixed goods was dropped from the published report in August, 1942. Since then, the superphosphate formerly included in dry base and mixed goods has been reported as either normal or concentrated superphosphate. Data for this report were obtained from reports by 52 manufacturers, representing 95 per cent of the total value of superphosphate as reported at the Biennial Census of Manufactures, 1939.

Beginning with the month of September, 1942, statistics relating to production, receipts, shipments, and stocks include all grades of superphosphate (normal, concentrated, and wet base goods) converted to a basis of 18 per cent available phosphoric acid. The reports for months prior to September, 1942, showed data on a 16 per cent basis. However, for comparative purposes they have been converted to 18 per cent A. P. A. basis in the table below.

| ITEM | 1943 JANUARY | 1942 DECEMBER | 1942 JANUARY | 1941 JANUARY |
|---|---|---|---|---|
| Stocks on hand beginning of month | 973,224 | 996,130 | [1]932,683 | [2]1,142,585 |
| Production | 485,872 | 485,276 | 433,035 | 362,837 |
| Received from other acidulators (including exchange transfers)[3] | 5,306 | 7,128 | 47,761 | 47,087 |
| Book adjustments (account of inventories) | +2,414 | +8,105 | +1,247 | +845 |
| Total supply | 1,466,816 | 1,496,639 | 1,414,726 | 1,553,354 |
| Disposition, total | 505,873 | 523,415 | [4] | [4] |
| Shipments, total | 304,324 | 351,596 | 262,544 | 214,282 |
| To mixers | 165,015 | 188,244 | 143,731 | 131,137 |
| To other acidulators (including exchange transfers) | 57,544 | 50,790 | 49,724 | 33,370 |
| To all others (including Government agencies) | 81,765 | 112,562 | 69,089 | 49,775 |
| Used in reporting plants | 201,549 | 171,819 | [4] | [4] |
| Stocks on hand, end of month | 960,943 | 973,224 | 962,542 | 1,124,339 |

[1] Reported as stocks on hand December 31, 1941.
[2] Reported as stocks on hand December 31, 1940.
[3] Data for January, 1943, and December, 1942, exclude base and mixed goods; data for January, 1942, and January, 1941, include base and mixed goods.
[4] Not available.

# FERTILIZER MATERIALS MARKET

## NEW YORK

**Allocation of North African Phosphates to Great Britain May Help Domestic Shortage of Concentrated Superphosphate. Organic Nitrogen Supply Still Extremely Inadequate. Potash Supplies Ample.**

*Exclusive Correspondence to "The American Fertilizer"*

NEW YORK, March 23, 1943.

The fertilizer industry has been considerably interested in the recent announcement from Washington concerning North African phosphate rock and concentrated superphosphate, one of the leading prizes of the Allied occupation of North Africa. Allocation of these materials was effected March 15th by the Combined Anglo-American Food Board, and said allocation was made to the United Kingdom. This ruling should have a beneficial effect upon supply of the same materials within our domestic markets inasmuch as the United Kingdom has been largely dependent upon Florida supplies in order to meet the increased fertilizer demands for the growing of essential foods in England.

Such relief to our industry should be helpful, but indications so far point to the fact that little, if any, triple superphosphate will be conserved for home consumption, in spite of the very heavy need for this commodity for the growing of home crops. The special need for this commodity is in sections such as Maine where high-analysis materials are used and where heavy potato requirements are needed. It would be particularly helpful if the superphosphate situation could be relieved on export as a definite shortage both in the ordinary grade and the high-analysis materials has developed.

### Sulphate of Ammonia

Demand is still heavy and exceeds supply in spite of continued heavy production by the various by-product plants. Prices remain the same under ceiling levels of $28.20 per net ton f. o. b. cars at inland producing points, and $29.20 per net ton at the ports.

It was anticipated some weeks ago that the release of various ammonia liquors would considerably fill the gap between demand and production of chemical ammonia, but that surplus has been rapidly absorbed; today all surplus put on the market has been absorbed, with demand still existing.

### Nitrate of Soda

Schedules remain unchanged, both for import and domestic material. All nitrate continues to be allocated by WPB.

Some relief in the top-dressing market was effected by a recent offering of ammonia nitrate being distributed in the Southeast by agents for the Canadian producers. All offerings of this commodity are subject to approval and allocation by WPB.

### Nitrogenous Materials

The tremendous scarcity of all types of organic nitrogen materials continues and markets are very strong. Supply is totally inadequate to meet demand, but there are some recent indications that this condition might be somewhat relieved through the importation of surpluses in South America. Indication of this possibility is a recent arrival of a large cargo of whale guano at a southern port. Although this material will reach the feed rather than the fertilizer trade, nevertheless, any addition of organics from outside sources coming into the general protein and ammonia American markets should be helpful. There have been small recent arrivals of castor beans from South America but in insufficient quantities to even approach demands.

### Potash

It is anticipated that increased production at the larger mines will adequately fulfill domestic requirements for this material in the new season. However, allocations will apparently continue in the new fertilizer season in the same manner as they now apply to spot sales of this commodity. Spot price remains at previous levels and will stay there for the duration of the season. New seasonal price will probably not be determined until mid-May.

### Phosphate Rock

Heavy demand for this material for the production of domestic superphosphate con-

tinues. Recent imports and the expectation of further quantities from Russia in the form of apatite will relieve the situation somewhat in coastal areas. Imports from Russia to date have been small, but it is anticipated that they will become heavier in later months.

## BALTIMORE

**Labor Shortage Handicapping Shipping Season. Shortage in Almost All Materials. Higher Grade Phosphate Rock Being Used.**

*Exclusive Correspondence to "The American Fertilizer"*

BALTIMORE, March 23, 1943.

The shipping season is now on and some of the manufacturers are experiencing difficulties in securing labor to get their orders out. There is no question but what they will be able to sell all they will be able to ship, but there is serious doubt as to whether the supply of raw materials will enable them to ship the usual tonnage.

*Organics.*—The demand for organics for feeding purposes is still strong, and this precludes the possibility of fertilizer manufacturers securing organics for their mixtures.

*Nitrogenous Material.*—There are no offerings on the market, and recent Governmental regulations prevent the use of most vegetable meals as sources of organic nitrogen.

*Sulphate of Ammonia.*—While the tonnage released for fertilizer has recently been increased, there is no doubt but what the tonnage available will fall far short of manufacturers' requirements, and this will be reflected in decreased tonnage which will be shipped this spring.

*Nitrate of Soda.*—There have been additional allocations of bulk nitrate released for mixing purposes, but not in sufficient volume to offset the deficiency in the form of sulphate of ammonia.

*Potash.*—Although it is probably 60 days before domestic producers are ready to consider contracts for another season, some of the manufacturers are now figuring on what tonnage they will need for another season. It is hardly likely there will be any stocks carried over from this to next year.

*Superphosphate.*—There have been rumors of a firmer market for another season, but up to the present time nothing definite has been done in the way of advancing prices. Due to the fact that the Government has allocated practically all triple superphosphate for export to Great Britain, practically all of the fertilizer manufacturers are now using higher grade rock to enable them to produce 20 per cent superphosphate without the necessity of adding triple super to the mixtures to bring it up to 20 per cent, and it is quite likely in the future that this will be the basis of calculation instead of 16 per cent as heretofore.

*Bone Meal.*—Nothing new in the situation as offerings of both raw and steamed bone are still few and far between.

*Bags.*—Practically all fertilizer manufacturers are now using paper for the shipment of their product, although some of them are still using second-hand burlap and cotton bags in a limited way. There is a ban against the use of new burlap for fertilizer bags, but this may be raised should supplies of burlap become more plentiful.

## CHARLESTON

**Cottonseed Meal Supply at Low Record. Other Organics Practically Out of Fertilizer Market. Some Additional Chemicals Released.**

*Exclusive Correspondence to "The American Fertilizer"*

CHARLESTON, March 22, 1943.

*Nitrogenous.*—Nothing further has developed and it remains doubtful whether any appreciable amount will be available before May.

*Castor Meal.*—Arrivals of approximately 5,000,000 pounds of beans have not changed the situation and castor meal will be allocated the coming season.

*Dried Blood.*—Unground is priced at $5.38 per unit ammonia ($6.54 per unit N) f. o. b. Chicago, but the supply is insufficient even for feed.

*Cottonseed Meal.*—The 8 per cent grade is priced in Atlanta at $38.60 and soya meal at $44.50, but quotations are entirely nominal.

Stocks of cottonseed cake and meal on hand at mills at close of February were only about 58,000 tons, the lightest on record for this time of year, and only about 15 per cent of the amount on hand with producers at the end of February, 1942. Some additional quantities of ammonia solutions, nitrate of soda, and cyanamid have been released by the WPB. The largest portion of the American production of triple superphosphate has now been allocated to the United Kingdom.

## PHILADELPHIA

**Superphosphate Prices Increased. Concentrated Superphosphates to United Kingdom. More Liberal Allotments of Chemical Nitrogen.**

*Exclusive Correspondence to "The American Fertilizer"*

PHILADELPHIA, March 22, 1943.

The main features of the past week or so (at least, the ones that have attracted the most attention) were: (1) the increase in price for superphosphate; and (2) the allocation of the major portion of concentrated superphosphates for the United Kingdom. Otherwise, the market situation is just about the same—demand high, supply low—and we will probably not see any change until victory is ours.

*Ammoniates.*—Numerous inquiries are still being received for higher analysis materials in the organic line, but producers and brokers find themselves unable to take care of old customers, due to the shortage.

*Sulphate of Ammonia.*—Continues under allocation, but allotments appear to be more liberal.

*Nitrate of Soda.*—This material, also, has been allocated a bit more freely, particularly for direct application to the soil.

*Bone Meals.*—No easing of the supply situation on this material, and it appears unlikely that there will be for the duration.

*Potash.*—The market on the different grades of this commodity continues tight, although the Russian importations ease the situation.

## TENNESSEE PHOSPHATE

**Weather Retards Spring Planting. Rock Shipments Continue at Maximum Rate. Ruhm Representatives Hold Meeting.**

*Exclusive Correspondence to "The American Fertilizer"*

COLUMBIA, TENN., March 22, 1943.

March weather has continued to exhibit the alternate days of beautiful balmy spring, freezing cold and heavy rainfall that still keep winter doing the lap-lingering act and retard the spring planting, already far behind the usual condition at this time of year.

Shipments of phosphate rock continue at the highest possible rate into all consuming channels. As there are no stocks on hand, ordinary breakdowns resulting from accidents likely to occur, cause more than usual interruption of shipping, as all shipments are being made from actual production, instead of having reserves to keep shipments moving.

The Ruhm Phosphate & Chemical Co. had an all week meeting of its Key Representatives last week, attended by E. W. "Farmer" Rusk, E. L. Johnson, J. A. Embser, O. L. Nixon, F. K. Mosely, and I. F. Green. Orders on hand cover the entire present production, as well as most of that expected from the two new mills now being rapidly installed by Hoover & Mason Phosphate Co., producers of Ruhm's phosphate, but these men are all busier than usual, trying to properly allocate the distribution of this commodity so necessary to Corn Belt farmers in their efforts to produce food for winning the war.

# SUL-PO-MAG

## SUPPLIES QUICK-ACTING MAGNESIUM

Time and labor costs are so important a factor in determining profits from fertilizer manufacture, you'll appreciate the superior mechanical condition of Sul-Po-Mag, International's exclusive Sulphate of Potash-Magnesia. It is shipped in the form of dry, clean, granular crystals. Smooth-flowing. Easy mixing. And remarkably free from any tendency to cake in storage. Ample supplies will be available to meet the requirements of the growing number of farmers who want higher quality, magnesium content fertilizers to help them produce the larger and better quality crops America needs now.

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*Water-Soluble*

**SULPHATE OF POTASH-MAGNESIA**

*The only Sulphate of Potash Magnesia produced in America*

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## CHICAGO

**Fertilizer Organics Suppliers Sold Up for Two Months. Processed Phosphate Rock May Replace Bone Meal in Feed.**

*Exclusive Correspondence to "The American Fertilizer"*

CHICAGO, March 22, 1943.

The situation continues rather monotonous; no trading of consequence in organics to report, and the demand is unceasing. Most sellers advise they are sold up into May and consistently decline offering deliveries beyond.

Steamed bone meal is in a similar position. The use of phosphate rock might solve the bone meal problem, as far as feed is concerned, providing sufficient rock is processed to remove the fluorine.

No change in ceiling prices: High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.53 per unit ammonia ($6.72 per unit N); blood, $5.38 ($6.54 per unit N); dry rendered tankage, $1.21 per unit of protein, Chicago basis.

## February Sulphate of Ammonia

There was practically no change in the production rate of by-product sulphate of ammonia during February, according to the figures of the U. S. Bureau of Mines. The quantity dropped about 8 per cent, to 59,132 tons but this is caused by the shorter work month. Shipments, however, continued at almost exactly the same figures which caused a reduction in stocks on hand at the end of the month, showing on hand 32,728 tons on February 28th. Ammonia liquor showed about the same trends as sulphate.

| | SULPHATE OF AMMONIA | AMMONIA LIQUOR |
|---|---|---|
| *Production* | *Tons* | *Tons $NH_3$* |
| February, 1943 | 59,132 | 2,591 |
| January, 1943 | 64,116 | 2,902 |
| February, 1942 | 58,598 | 2,605 |
| January–February, 1943 | 123,247 | 5,493 |
| January–February, 1942 | 124,146 | 5,509 |
| *Shipments* | | |
| February, 1943 | 66,821 | 2,834 |
| January, 1943 | 66,914 | 2,831 |
| February, 1942 | 61,706 | 2,950 |
| *Stocks on Hand* | | |
| February 28, 1943 | 32,728 | 1,080 |
| January 31, 1943 | 40,592 | 1,201 |
| February 28, 1942 | 18,300 | 788 |
| January 31, 1942 | 21,585 | 896 |

## Potash Analyzed by Its Radioactivity

Fertilizers and other mixtures containing potassium possess radioactivity which can be used to measure the quantity of potassium present, according to R. Bowling Barnes and D. J. Salley, of American Cyanamid Company's Stamford (Conn.) Research Laboratories, in a report recently published by the American Chemical Society.

Radioactivity of mixtures and compounds containing potassium is weak but measurable by extremely sensitive modern physical instruments, Drs. Barnes and Salley found. Furthermore, intensity of radioactivity of common materials is proportional to the quantity of potassium present. No other common element possesses this property.

Utilizing an instrument known as the Geiger Counter originally developed to measure radioactivity, Drs. Barnes and Salley have perfected a simple speedy method of analyzing materials for their potassium content which surpasses chemical methods now used, in accuracy as well as speed. The usual chemical analysis requires that the potassium in the sample be laboriously separated from other elements present and converted into a salt of chloroplatinic acid (containing platinum) to be finally weighed.

In the new method employing radioactivity, the sample is merely dissolved in water, with or without the addition of an acid to assist the process, and the solution is introduced into a specially constructed glass counter tube. When the tube is properly connected to the counting instrument, tiny impulses caused by

the radioactive changes in the potassium atoms of the sample actuate the counting mechanism. The number of counts registered per minute or per hour gives the amount of potassium present in the sample after suitable pre-determined corrections are applied. The entire operation requires only a few minutes or hours, depending on the degree of accuracy required, as compared with a period many times longer necessary for the usual chemical analysis.

The counting instrument used is so sensitive that one of the corrections that must be applied to the results takes into account the effects of cosmic rays reaching the earth from interstellar space. This correction must be determined frequently to allow for variations in the intensity of cosmic rays. Otherwise, the result of the instrument's count is corrected for the density of the solution of the sample and is then compared with a calibration curve characteristic of the apparatus to give directly the percentage of potassium in the sample.

## Bemis Expands Southern Factory Facilities

To meet the rapidly increasing war needs for packaging in the South, the Bemis Bro. Bag Co. is increasing its production of multiwall bags in that section by relocating, at Mobile, Alabama, existing equipment to produce sewn and pasted, valve and open-mouth, multiwall paper bags. This move will result in the saving of transportation facilities so needed for the war effort.

Operations to be started within a few weeks in a plant adjacent to the paper mill of the Hollingsworth & Whitney Co. will make available to multiwall bag users in the South the Bemis Company's long experience in the design and manufacture of paper bags combined with the outstanding kraft paper of this modern mill.

The starting of multiwall paper bag manufacture at Mobile will in no way interfere with the ability of the other five Bemis multiwall factories, located at Peoria, Illinois; East Pepperell, Massachusetts; St. Helens, Oregon; San Francisco, Wilmington and Los Angeles, California, to take care of their customers. In fact, it will enable multiwall bag users in the South and elsewhere to get better service than they have ever had before. The Bemis Mobile plant will serve the entire southern territory stretching along the Atlantic seaboard to include North Carolina and west through Texas. C. E. Hayward, who has had long experience in the manufacture of bags and who has been with the Bemis Company for 18 years, will manage the plant. Shelby W. Brown, who for many years has traveled the southern territory as a representative of the Bemis factory at New Orleans, will be the sales manager.

## Fertilizer Sales by States

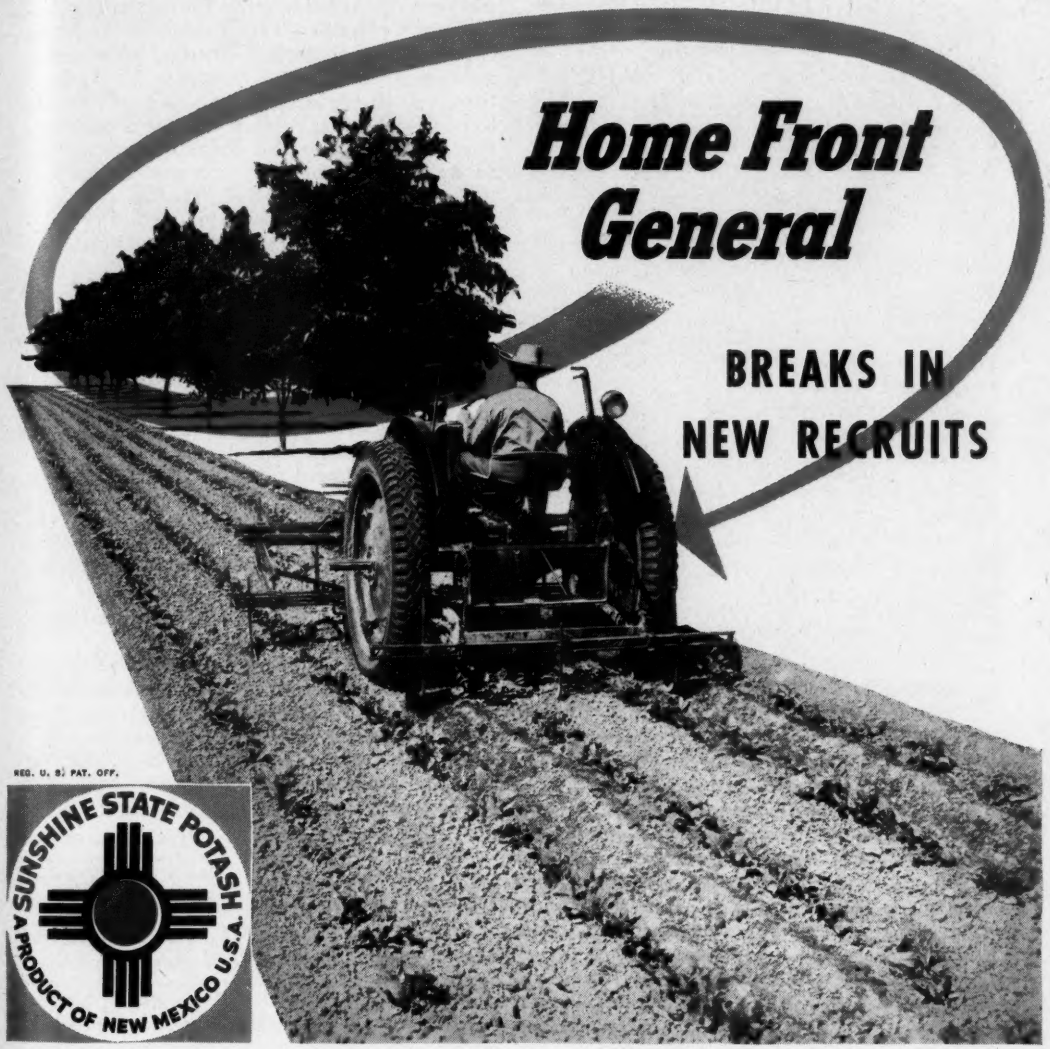
### Maryland

According to L. E. Bopst, Associate State Chemist, fertilizer sales in Maryland totaled 182,720 tons in 1942, as compared with 171,941 tons in 1941. The number of firms registered dropped from 106 in 1941 to 99 in 1942, while analyses sold came to 120 in 1942, a decrease from 128 in 1941. Of the 92 grades of mixed fertilizers, only 20 had sales of 1,000 tons or more, while 24 grades sold less than 100 tons each. Comparative figures for 1942 and 1941 are as follows:

| | *1941* | *1942* |
|---|---|---|
| Total tonnage | 171,941 | 182,720 |
| 15 best sellers | 134,269 | 148,286 |
| Recommended grades | 97,009 | 105,519 |
| Complete fertilizers | 131,470 | 109,854 |
| Phosphate-potash grades | 10,809 | 48,837 |

### Michigan

Sales of fertilizers in Michigan totaled 187,517 tons in 1942, according to figures compiled by C. E. Millar, Professor of Soils, Michigan State College. This is an increase of 11 per cent over 1941, and 29 per cent over 1939. Sales of grades recommended by Michigan State College constituted 94 per cent of the total. Only 1.37 per cent of the mixed fertilizers sold contained less than 20 per cent plant food. Sales during the year were divided into 141,146 tons sold in the spring and 46,371 tons in the fall. The total tonnage of mixed fertilizers was 166,724;




Soon America's army of farmers will again begin the battle of food production. In a million fields, the long ranks of growing plants will flourish under their care.

The farmer must not, and he will not, fail. For it is his tremendous job to produce not only for our soldiers and civilians, but those of our Allies as well.

Helping him in this vast undertaking are your fertilizers; many of them compounded with potash, the important plant nutrient that means healthy, abundant crops.

* * *

Thus, Sunshine State Higrade Muriate of Potash and the other grades you know stand ready to aid the farmer in his fight.

**HIGRADE MURIATE OF POTASH, 62/63% $K_2O$. ALSO 50% $K_2O$ GRADE MANURE SALTS, 22% $K_2O$ MINIMUM**

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superphosphate, 16,107; all other materials, 4,686.

**Minnesota**

Total consumption of fertilizers in Minnesota during 1942 was 35,830 tons, of which 10,695 tons were distributed by AAA. This is an increase of about 10 per cent over the previous year. Twenty-two grades of mixed fertilizers and 9 materials were sold in the state.

**New Hampshire**

A grade survey of New Hampshire for the crop year 1941–1942 shows total fertilizer consumption of 28,637 tons. Commercial sales amounted to 16,609 (12,428 tons of mixed fertilizers and 4,181 tons of materials) while AAA distributed 12,028 tons. The 10 leading grades accounted for 82 per cent of the total mixed fertilizer tonnage.

**New Jersey**

The figures for fertilizer sales in New Jersey, issued by Firman E. Bear, Soil Chemist, show a notable increase during 1942. The total fertilizer tonnage for 1942 was 211,023 tons, an increase of 35 per cent over the 156,142 tons produced in 1941. Although 135 grades were registered, only 7 showed sales of more than 1,000 tons each, while 65 grades failed to sell as much as 100 tons each. Comparative figures for the past two years are as follows:

| | *1941* | *1942* |
|---|---|---|
| Total tonnage | 156,142 | 211,023 |
| Mixed fertilizers | 135,880 | 176,518 |
| Materials | 20,262 | 34,505 |
| 9 Recommended Ratios | 53,478 | 88,405 |

## N. F. A. Revises Garden Pamphlet

The pamphlet "The Home Garden" which was published last spring by the National Fertilizer Association for the use of its members, has been re-issued with the necessary changes in the fertilizer recommendations to conform to Food Production Order 5. This 8-page pamphlet, prepared by Robert H. Engle, tabulates information on planting space and approximate yield for the principal garden crops, and outlines the requirements in location and soil conditions for a successful garden. The final pages deal with fertilization problems, how and when to apply and the kind of fertilizer to use.

## Cotton Acreage Allotments Increased

Cotton farmers may exceed their 1943 cotton acreage allotments by 10 per cent, without loss of agricultural conservation payments, without being liable for cotton marketing quota penalties, and without forfeiture of cotton loan privileges, according to a recent announcement by the Secretary of Agriculture. A 10 per cent increase should enable some areas to make a more complete contribution to the protein and edible oil production, as well as meeting war crop goals, and will make up for underplanting in other areas, due to the shortage of labor and increased production of vegetables, peanuts, and soybeans.

## February Sulphur Production

Although in February mine shipments of native sulphur were 16 per cent greater than in January, the rate of movement has not yet reached the average of 1942 (261,000 tons per month) according to figures released by the Bureau of Mines, United States Department of the Interior.

With a 13 per cent reduction from the January total, production in February reached the lowest level since the compilation of monthly statistics was instituted by the Bureau of Mines in August 1940. Producers' stocks were reduced by 25,092 tons during February, indicating that sales exceeded production for the first time since June, 1942. Stocks are ample and production has been brought into balance with withdrawals.

In the first two months of 1943 production was 23 per cent and mine shipments 4 per cent lower than in the same period in 1942.

| Period | Production | Mine Shipments | Producers' Stocks* |
|---|---|---|---|
| Jan., 1943 | 231,086 | 171,755 | 5,148,206 |
| Feb., 1943 | 200,802 | 199,893 | 5,123,114 |
| Jan.–Feb., 1942 | 560,160 | 385,464 | 4,822,070 |
| Jan.–Feb., 1943 | 431,888 | 371,648 | 5,123,114 |

* Producers' stocks at mines, in transit, and in warehouses at end of period. Inasmuch as fluctuations in warehouse stocks are not reflected in mine-shipment figures, the tabular data will not balance.

# A Complete Service

THE strategic factory locations of the American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

We manufacture all grades of Commercial Fertilizers, Superphosphate, Agrinite Tankage, Bone Black, Bone Black Pigments (Cosmic Black), Dicalcium Phosphate, Monocalcium Phosphate, Gelatin, Glue, Ground Limestone, Crushed Stone, Agricultural Insecticides (including Pyrox, Arsenate of Lead, Calcium Arsenate, etc.), Trisodium and Disodium Phosphate, Phosphorus, Phosphoric Acid, Sulphuric Acid, Salt Cake; and we are importers and/or dealers in Nitrate of Soda, Cyanamid, Potash Salts, Sulphate of Ammonia, Raw Bone Meal, Steamed Bone Meal, Sheep and Goat Manure, Fish, Blood and Tin-Tetrachloride. We mine and sell all grades of Florida Pebble Phosphate Rock.

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Charleston, S. C.
Cincinnati, Ohio
Cleveland, Ohio
Detroit, Mich.
East St. Louis, Ill.
Greensboro, N. C.
Havana, Cuba
Henderson, N. C.
Montgomery, Ala.
Norfolk, Va.
No. Weymouth, Mass.
Pensacola, Fla.
Pierce, Fla.
Port Hope, Ont., Can.
Presque Isle, Me.
Savannah, Ga.
Searsport, Maine
South Amboy, N. J.
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Port Hope, Ont., Can
St. Paul, Minnesota
Savannah, Ga.
Spartanburg, S. C.
Wilmington, N. C.

## CARBON-HYDROGEN RATIOS IN ORGANIC FERTILIZER MATERIALS IN RELATION TO THE AVAILABILITY OF THEIR NITROGEN

(*Continued from Page 9*)

tent greater than 20 per cent had more than 50 per cent of their nitrogen extracted by the dilute HCl. None of the materials containing less than 20 per cent crude protein had more than 36.2 per cent of their nitrogen extracted by this treatment. There was a sharp distinction between high- and low-protein materials on the basis of the proportion of nitrogen remaining insoluble after the $H_2SO_4$ treatment. The high-nitrogen materials had between 2.5 and 8.9 per cent of their nitrogen in this class, whereas the low-nitrogen materials had from 16.1 to 75.5 per cent in the same category. The data for the latter materials tend to indicate that a high resistance of nitrogen compounds to decomposition also plays a part in explaining the poor quality of low-nitrogen sources, since a considerable proportion of the nitrogen of such materials was not rendered soluble by even the drastic $H_2SO_4$ treatment during the proximate analysis.

### Nitrification of Water-Soluble Fraction

To study the nitrification of the water-soluble nitrogen of organic ammoniates, five unwashed materials were chosen: animal tankage, special soybean meal, Peruvian guano, hoof meal, and tobacco stems, as all of these contain substantial percentages of water-soluble nitrogen. Cold-water extracts of these organics were prepared, and the nitrogen and carbon contents of these extracts were determined, the carbon being estimated by the wet combustion method (5). Sufficient amounts of the diluted extracts to supply 20 mgm. of nitrogen were then mixed with soil and submitted to the usual nitrification procedure.

The carbon-nitrogen ratios of the soluble fractions, including urea, and the nitrification data for their nitrogen are given in Table 7. The nitrification of the soluble nitrogen from tobacco stems and animal tankage was considerably greater than that from their water-insoluble counterparts (Table 2). With the special soybean meal, hoof meal, and Peruvian guano there appeared to be little difference between the nitrification of the water-soluble and of the water-insoluble nitrogen, any

**TABLE 6**

**Separation of Nitrogen in Washed Organic Materials**

| WASHED MATERIAL | TOTAL NITROGEN | FRACTION OF TOTAL NITROGEN | | | | | |
|---|---|---|---|---|---|---|---|
| | | Cold Water Soluble | Hot Water Soluble | Removed by 2 per cent HCl | Removed by 80 per cent $H_2SO_4$ | Residual Nitrogen | Unaccounted for |
| | PER CENT | PER CENT | PER CENT | PER CENT | PER CENT | PER CENT | PER CENT |
| Cottonseed meal | 8.70 | 1.0 | 7.1 | 82.2 | 2.6 | 2.5 | 4.6 |
| Special soybean meal | 6.43 | 7.8 | 5.4 | 56.8 | 20.5 | 4.9 | 4.6 |
| Castor pomace | 5.12 | 7.5 | 15.8 | 54.6 | 6.5 | 7.1 | 8.5 |
| Cocoa meal | 2.95 | 4.2 | 4.1 | 25.1 | 24.5 | 36.2 | 5.9 |
| Alfalfa hay | 2.19 | 10.6 | 8.1 | 35.2 | 19.5 | 16.1 | 10.5 |
| Tobacco stems | 0.88 | 7.4 | 5.5 | 28.5 | 37.7 | 29.3 | −8.4 |
| Peanut hull meal | 0.89 | 9.1 | 6.0 | 36.2 | 13.6 | 31.0 | 4.1 |
| Hynite tankage | 10.07 | 5.0 | 17.9 | 59.5 | 13.6 | 3.5 | 0.5 |
| Smirow | 7.92 | 0.9 | 9.3 | 70.4 | 10.2 | 5.0 | 4.2 |
| Dried blood | 14.66 | 1.0 | 1.6 | 81.6 | .... | 8.6 | 7.2 |
| Acid fish scrap | 8.43 | 1.5 | 3.9 | 34.3 | 45.2 | 8.9 | 6.2 |
| Bovung | 1.76 | 4.5 | 3.9 | 22.6 | 31.7 | 39.0 | −1.7 |
| Horse manure | 1.32 | 10.3 | 13.0 | 30.8 | 14.5 | 25.0 | 6.6 |
| Milorganite | 6.04 | 3.5 | 5.5 | 51.6 | 27.2 | 8.7 | 3.5 |
| Sewage sludge | 1.82 | 3.6 | 5.2 | 18.4 | 39.2 | 28.3 | 5.3 |
| Garbage tankage | 2.80 | 1.7 | 2.4 | 6.4 | 11.7 | 75.5 | 2.3 |
| Manito humus | 2.71 | 1.7 | 2.7 | 22.7 | 31.9 | 41.6 | −0.6 |

*See Page 4*

slight differences that existed being in favor of the former. With the water-soluble nitrogen a close relation existed between the C–N ratio and the nitrification value.

The nitrification of the nitrogen of both the water-soluble and the water-insoluble portions of five organics being known, a calculation was made of the nitrification to be expected from the unwashed organics, the relative proportions of water-soluble and water-insoluble nitrogen in the unwashed material being used. The comparison between the values found and those calculated is made in Table 8. There is fair agreement, especially with the nitrification of the nitrogen of animal tankage at 20- and 40-day periods, and with that of Peruvian guano at the end of 40 days.

**TABLE 7**

**Nitrification of Nitrogen Derived from Water-Soluble Portions of Organic Ammoniates**

| Source of Water-Soluble Nitrogen | C–N Ratio | Added Nitrogen Converted to Nitrate 20 Days per cent | 40 Days per cent | 60 Days per cent |
|---|---|---|---|---|
| Urea | 0.43 | 87 | 88 | 86 |
| Peruvian guano | 0.51 | 68 | 84 | 79 |
| Hoof meal | 2.30 | 57 | 67 | 69 |
| Animal tankage | 2.53 | 52 | 57 | 58 |
| Special soybean meal | 5.07 | 52 | 56 | 64 |
| Tobacco stems | 19.8 | 18 | 31 | 33 |

**TABLE 8**

**Nitrification of Nitrogen of Unwashed Organic Ammoniates as Calculated from Data on Water-Soluble and Water-Insoluble Portions**

| Source of Nitrogen | Added Nitrogen Converted to Nitrate 20 Days per cent | 40 Days per cent | 60 Days per cent |
|---|---|---|---|
| Special soybean meal | | | |
| Found | 61 | 66 | .. |
| Calculated | 51 | 56 | 60 |
| Tobacco Stems | | | |
| Found | −14 | 5 | 6 |
| Calculated | 1 | 10 | 15 |
| Hoof meal | | | |
| Found | 65 | 68 | .. |
| Calculated | 57 | 62 | 65 |
| Animal tankage | | | |
| Found | 37 | 45 | .. |
| Calculated | 35 | 45 | 48 |
| Peruvian guano | | | |
| Found | 80 | 77 | .. |
| Calculated | 67 | 79 | 79 |

## CONCLUSIONS

The results obtained indicate that the principle of the C–N ratio may be applied with success in interpreting the availability behavior of many organic ammoniates. This seems to be especially true of water-soluble nitrogen. In the water-insoluble fractions, ease of decomposition and relative abundance of the associated carbonaceous material must be considered, as well as the decomposability of the insoluble nitrogenous material itself, before a rigid application of C–N ratios to availability can be made. The insoluble nitrogen of process tankages and bone meal is of poor availability not because of unfavorable C–N ratios but because of resistance to decomposition of their nitrogen-containing compounds. The similar behavior of washed low-nitrogen materials may be due partly to the same property and partly to the presence of large amounts of easily decomposable carbon.


## Summary

A series of 34 organic ammoniates and waste organic materials were tested with regard to the availability of their nitrogen. Ratings, particularly of their insoluble nitrogen, were made of these materials by vegetative, nitrification, and permanganate methods. A study was then made as to the applicability of the principle of the C–N ratio in explaining the estimated availability of the nitrogen of these materials. This principle proved to be a valuable supplemental aid in determining the quality of the nitrogen in these materials. In some cases, it was found necessary to apply a correction to the C–N ratio by eliminating the carbon of the lignin in the material. For certain materials, however, the application of this correction factor failed to bring the products into line with the known availability of their nitrogen.


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# BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

**This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.**
**For Alphabetical List of Advertisers, see page 33.**

**ACID BRICK**
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

**ACID EGGS**
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**ACIDULATING UNITS**
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DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

**AMMONIA LIQUOR**
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Hydrocarbon Products Co., New York City.

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**AMMONIATING EQUIPMENT**
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**AMMONIUM NITRATE SOLUTIONS**
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

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**BEARINGS**
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**BELT LACING**
Sackett & Sons Co., The A. J., Baltimore, Md.

**BELTING—Chain**
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Link-Belt Company, Philadelphia, Chicago.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

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**BONE BLACK**
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Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

**BONE PRODUCTS**
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

**BORAX AND BORIC ACID**
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Pacific Coast Borax Co., New York City.

**BROKERS**
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Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

**BUCKETS—Elevator**
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Stedman's Foundry and Mach. Works, Aurora, Ind.

A Classified Index to Advertisers in "The American Fertilizer"

# BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

**BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag Line, Special; Electrically Operated and Multi Power**
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

**BURNERS—Sulphur**
Chemical Construction Corp., New York City.

**BURNERS—Oil**
Monarch Mfg. Works, Inc., Philadelphia, Pa.
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**CABLEWAYS**
Hayward Company, The, New York City.

**CARBONATE OF AMMONIA**
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

**CARS—For Moving Materials**
Link-Belt Company, Philadelphia, Chicago.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

**CARTS—Fertilizer, Standard and Roller Bearing**
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Sackett & Sons Co., The A. J., Baltimore, Md.

**CASTINGS—Acid Resisting**
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Duriron Co., Inc., The, Dayton, Ohio.

**CASTINGS—Iron and Steel**
Link-Belt Company, Philadelphia, Chicago.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

**CEMENT—Acid-Proof**
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Chemical Construction Corp., New York City.

**CHAIN DRIVES—Silent**
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**CHAINS AND SPROCKETS**
Link-Belt Company, Philadelphia, Chicago.
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**CHAMBERS—Acid**
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Fairlie, Andrew M., Atlanta, Ga.

**CHEMICAL APPARATUS**
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

**CHEMICALS**
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

**CHEMICALS—Continued**
International Minerals & Chemical Corporation, Chicago, Ill
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

**CHEMICAL PLANT CONSTRUCTION**
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Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Bradley & Baker, New York City.
Huber & Company, New York City
Jett, Joseph C., Norfolk, Va.
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Wellmann, William E., Baltimore, Md.

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Bradley & Baker, New York City.
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Wellmann, William E., Baltimore, Md.

**DENS—Superphosphate**
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A Classified Index to Advertisers in "The American Fertilizer"

# BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

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**DRYERS—Direct Heat**
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Stedman's Foundry and Mach. Works, Aurora, In l

A Classified Index to Advertisers in "The American Fertilizer"

# BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 13

**MACHINERY—Power Transmission**
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

**MACHINERY—Pumping**
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Duriron Co., Inc., The, Dayton, Ohio.

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**MAGNETS**
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McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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American Agricultural Chemical Co., New York City.
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Huber & Company, New York City.
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Bradley & Baker, New York City.
Huber & Company, New York City.
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McIver & Son, Alex. M., Charleston, S. C.
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Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
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Virginia-Carolina Chemical Corp. (Mining Dept.), Richmond, Va.
Wellmann, William E., Baltimore, Md.

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**PIPES—Wooden**
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Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Monarch Mfg. Works, Inc., Philadelphia, Pa.

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Wellmann, William E., Baltimore, Md.

**QUARTZ**
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

**RINGS—Sulphuric Acid Tower**
Chemical Construction Corp., New York City.

**ROUGH AMMONIATES**
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McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

A Classified Index to Advertisers in "The American Fertilizer"

# BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

**SCALES—Including Automatic Bagging**
Atlanta Utility Works, East Point, Ga.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

**SCRAPERS—Drag**
Hayward Company, The, New York City.

**SCREENS**
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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Sackett & Sons Co., The A. J., Baltimore, Md.

**SEPARATORS—Including Vibrating**
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**SEPARATORS—Magnetic**
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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Atlanta Utility Works, East Point, Ga.
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**SHOVELS—Power**
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

**SPRAYS—Acid Chambers**
Monarch Mfg. Works, Inc., Philadelphia, Pa.

**SPROCKET WHEELS (See Chains and Sprockets)**

**STACKS**
Sackett & Sons Co., The A. J., Baltimore, Md.

**SULPHATE OF AMMONIA**
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

**SULPHUR**
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

**SULPHURIC ACID**
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M. Charleston, S. C.

**SULPHURIC ACID—Continued**
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

**SUPERPHOSPHATE**
American Agricultural Chemical Co., New York City.
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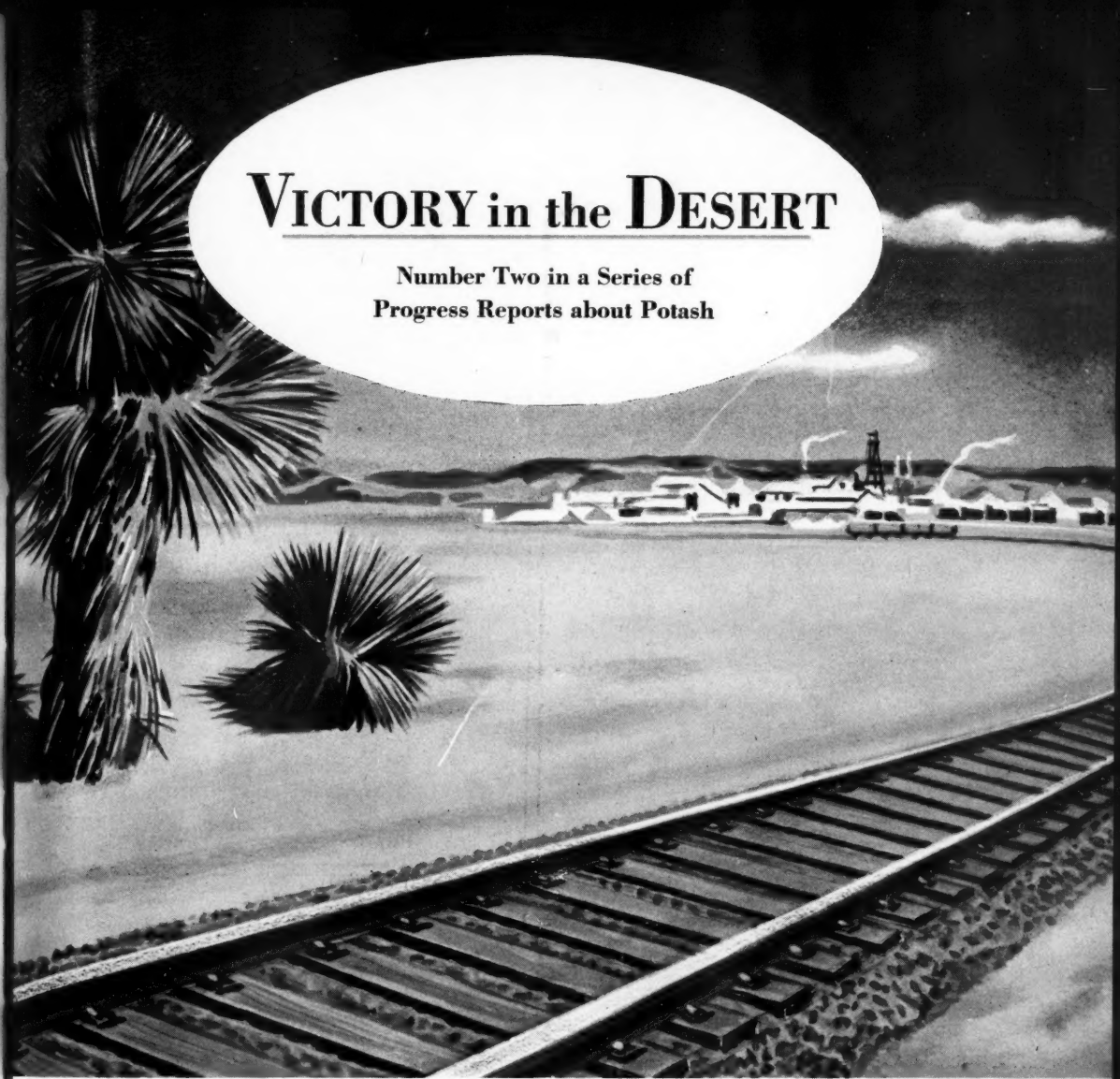

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